PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

4396

To:

FENSTER, Paul et al.
FENSTER & COMPANY
INTELLECTUAL PROPERTY LTD.
P.O. Box 10256
IL-49002 Petach Tikva
ISRAEL

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NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

	Date of mailing *(day/month/year)* 11.05.2006
Applicant's or agent's file reference 414/04396	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/IL2005/000137	04.02.2005	05.02.2004

Applicant
REABILITY INC. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Tayea, T Tel. +49 89 2399-7457

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 414/04396	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/IL2005/000137	International filing date *(day/month/year)* 04.02.2005	Priority date *(day/month/year)* 05.02.2004
International Patent Classification (IPC) or national classification and IPC INV. A61H1/02 A61H3/00 A63B23/035		
Applicant REABILITY INC. et al.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
16.02.2006	11.05.2006
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Elmar Fischer Telephone No. +49 89 2399-7290

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

☒ the international application in the language in which it was filed

☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-27 as originally filed

Claims, Numbers

1-49 filed with telefax on 30.04.2006

Drawings, Sheets

1/4-4/4 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☒ the claims, Nos. 50-52
- ☐ the drawings, sheets/figs
- ☐ the sequence listing *(specify)*:
- ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing *(specify)*:
- ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 38-49

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*.

☒ no international search report has been established for the said claims Nos. 38-49

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b) and 13*ter*.2.

☐ a meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions, and such tables were not available to the International Preliminary Examining Authority in a form and manner acceptable to it.

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☐ See separate sheet for further details

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-37
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-37
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-37
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Claims 38-49 relate to subject-matter considered by this Authority to be covered by the provisions of Rule 67.1(iv) PCT, namely to methods for treatment of the human or animal body by therapy. Consequently, no opinion will be formulated with respect to novelty, inventive step and industrial applicability of the subject-matter of these claims (Article 34(4)(a)(i)).

In particular, independent method claim 38 includes medical treatment steps like coupling a patient to a rehabilitation system and performing a rehabilitation activity, the purpose and inevitable effect being therapeutic, namely rehabilitation of lost limb control.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

I. Documents

Reference is made to the following documents:

D1: JP 02 102652 A;

D1': PATENT ABSTRACTS OF JAPAN vol. 014, no. 306 (C-0735), 3 July 1990 (English abstract of D1);

D2: US-A-5 397 865;

D3: US-A-5 846 086;

D4: EP-A-0 304 538;

D5: JP 2002 127058 A;

D5': PATENT ABSTRACTS OF JAPAN vol. 2002, no. 09, 4 September 2002 (English abstract of D5);

D6: JP 2003 164544 A;

D6': PATENT ABSTRACTS OF JAPAN vol. 2003, no. 10, 8 October 2003 (English abstract of D6).

II. Requirements of Article 6 PCT - Clarity

1. According to claim 1, the rehabilitation apparatus comprises a sensor adapted to sense a movement of a motion support element which latter is adapted to support

a motion of a part of a human, and a controller adapted to modify a generator provided rhythmic audio in accordance with the sensed movement. As a consequence, it is not clear how such an apparatus could be suitable for a patient who is completely unable to control the limb, and thus to actively move the limb, as mentioned in the description, page 11, lines 1, 2.

Further, several examples mentioned in the description do not necessarily comprise an audio generator, or do not correlate audio and movement, and thus are not covered by independent claim 1: See e.g. page 10, lines 15, 16; page 18, lines 10-12; page 24, lines 1-10 (correlation between movement and "points" instead of audio).

2. According to claim 1, the controller is adapted to control the generator of audio to generate rhythmic audio timed to a stored desired movement. However, it is neither clear if the features "correctness" and "error" as mentioned in claims 13-17 are related to that stored desired movement (see especially claim 15: is the "stored plan" identical to the "stored desired movement"?), nor which additional structural features (cf. first sentence of Rule 6.4(a) PCT) of the apparatus should be defined by these claims.

A plurality of dependent claims is totally vague and thus likewise leaves the reader in doubt which additional structural features are intended to be claimed. Further, numerous claims attempt to define the invention in terms of a result to be achieved, rather than defining the structural technical features that are necessary to achieve the stated result (Article 6 PCT; PCT International Search and Preliminary Examination Guidelines 5.35). See especially claims 20-29, 31, 34.

III. Requirements of Article 33(2), (3) PCT - Novelty / Inventive step

1. Document D6, which is regarded as being the closest prior art to the subject-matter of **claim 1**, discloses (see esp. Figs. 1, 2) (the references in parentheses applying to this document):

A rehabilitation apparatus, comprising:
at least one motion support element (handle (6)) adapted to support a motion of a part of a human;

at least one sensor adapted to sense a movement and generate a movement signal of said at least one motion support element (force sensor at the lower end of (6), see [0013], [0014]);
a generator of audio (see [0017]); and,
a controller in communication with said generator and said at least one sensor, said controller adapted to:
control said generator of audio to generate rhythmic audio timed to a stored desired movement of said human (see [0012], [0017], claim 1); and
receive said sensed movement signal from said at least one sensor.

Due to the provision that the controller is adapted to modify the generator provided rhythmic audio in accordance with said sensed movement signal, the rehabilitation effect of the apparatus is improved.

In the apparatus known from D6 the sensor is used only to start movement of the apparatus in the back or forth direction. Once the patient is walking, walk is continued with the help of rhythmic audio. However, the rhythm of the audio is not changed. On the contrary, even if the patient applies a much stronger force on the handle, the fixed speed of the apparatus, which is set beforehand, is maintained (see e.g. claim 1 and [0014]). Thus, D6 teaches away from the claimed subject-matter. The other available prior art likewise does not contain any hint to provide a controller that is adapted to modify the rhythmic generator provided audio in accordance with the sensed movement signal.

As a consequence, the subject-matter of claim 1 is considered not only as being novel (Article 33(2) PCT), but also as involving an inventive step (Article 33(3) PCT).

2. **Claims 2-37** are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. Rehabilitation apparatus, comprising:

at least one motion support element adapted to support a motion of a part of a human;

at least one sensor adapted to sense a movement and generate a movement signal of said at least one motion support element;

a generator of audio; and,

a controller in communication with said generator and said at least one sensor, said controller adapted to:

control said generator of audio to generate rhythmic audio timed to a stored desired movement of said human;

receive said sensed movement signal from said at least one sensor; and,

modify said generator provided audio in accordance with said sensed movement signal.

2. Apparatus according to claim 1, wherein said motion support element is adapted for attachment to a human.

3. Apparatus according to claim 1, wherein said motion support element is adapted for gripping by a human.

4. Apparatus according to any of claims 1-3, wherein said motion support element is adapted to assist a movement by a human.

5. Apparatus according to claim 4, wherein said assisting comprises moving a portion of said human.

6. Apparatus according to claim 4 or claim 5, wherein said assisting comprises following a motion of said human while providing at least part of a motive force.

7. Apparatus according to any of claims 4-6, wherein said assisting comprises restricting a motion of said human.

8. Apparatus according to any of claims 1-7, wherein said motion support element is adapted to resist a movement by a human.

9. Apparatus according to claim 8, wherein said resistance is not spatially uniform.

10. Apparatus according to any of claims 1-9, wherein said motion support element initiates said motion.

11. Apparatus according to claim 10, wherein said motion support element moves said human.

12. Apparatus according to claim 10 or claim 11, wherein said motion support cues said human to start said motion.

13. Apparatus according to any of claims 1-12, wherein said controller generates said audio responsive to a correctness of said motion.

14. Apparatus according to claim 13, wherein said controller modifies said audio during a motion according to a correctness of said motion.

15. Apparatus according to claim 13 or claim 14, wherein said correctness is judged against a stored plan.

16. Apparatus according to any of claims 13-15, wherein said controller judges correctness against one or more criteria.

17. Apparatus according to any of claims 13-16, wherein said controller distorts said audio according to a degree of error of said motion.

18. Apparatus according to claim 1, wherein said audio is generated before said movement.

19. Apparatus according to claim 1, wherein said audio is generated in time with

said movement.

20. Apparatus according to claim 1, wherein at least one plan is stored in said controller which said controller uses to anticipate changes in said movement and generate audio during said movement.

21. Apparatus according to any of claims 18-20, wherein said controller is configured to generate a score according to a synchronization between movements to specific spatial locations and said audio.

22. Apparatus according to any of claims 18-21, wherein said controller is configured to mix a predetermined musical stream and audio generated according to said motion.

23. Apparatus according to any of claims 18-22, wherein said controller comprises a memory that links musical elements with motion elements.

24. Apparatus according to claim 23, wherein said controller generates said audio from musical elements corresponding to different body parts.

25. Apparatus according to claim 23, wherein said controller generates said audio from musical elements corresponding to different motions.

26. Apparatus according to any of claims 1-25, wherein said controller generates said audio according to a difference between a desired motion and an actual motion.

27. Apparatus according to any of claims 1-26, wherein said controller analyzes said movement signal from said sensor to generate a music stream according to said movement signal.

28. Apparatus according to any of claims 1-27, wherein said controller generates said stream as a set of instructions prior to detecting motion of said human.

29. Apparatus according to any of claims 1-28, wherein said controller generates

series of musical notes and corresponding spatial motions.

30. Apparatus according to any of claims 1-29, wherein said controller has stored therein a plurality of trajectories of motion of said human.

31. Apparatus according to any of claims 1-30, wherein said controller has stored therein a rehabilitation program for said human.

32. Apparatus according to any of claims 1-31, wherein said audio comprises music.

33. Apparatus according to any of claims 1-32, wherein said audio generator is adapted to modify existing music.

34. Apparatus according to claim 1, wherein said controller is adapted to detect a physiological indicator of said human using said sensor and generate music responsive thereto.

35. Apparatus according to any of claims 1-34, wherein said apparatus is portable by an unassisted human.

36. Apparatus according to any of claims 1-35, wherein said apparatus is wearable.

37. Apparatus according to any of claims 1-36, wherein said apparatus comprises a stable base and at least one moving extension.

38. A method of rehabilitation, comprising:
coupling a patient to a rehabilitation system;
performing a rehabilitation activity by said patient; and
automatically generating music correlated with said rehabilitation activity.

39. A method according to claim 38, wherein automatically generating comprises providing at least one cue to said patient.

40. A method according to claim 38, wherein automatically generating comprises providing at least one musical instruction to said patient.

41. A method according to claim 38, wherein automatically generating comprises providing feedback on a physical action using music.

42. A method according to claim 38, wherein automatically generating comprises providing said music to other rehabilitated patients.

43. A method according to claim 38, comprising selecting music for a cognitively impaired patient.

44. A method according to any of claims 38-43, wherein automatically generating comprises generating music according to a correctness of motion.

45. A method according to any of claims 38-44, wherein automatically generating comprises generating music timed according to a desired motion.

46. A method according to claim 45, wherein automatically generating comprises requiring said patient to reach spatial locations according to a musical feature of said music.

47. A method according to claim 45, wherein automatically generating comprises generating a musical channel to overlay an existing musical channel according to a motion of said patient.

48. A method according to any of claims 38-47, wherein automatically generating music comprises generating music to synchronize motions of different points in a body of said patient.

49. A method according to any of claims 38-47, wherein automatically generating music comprises said patient bringing music to said system.